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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,688	11/20/2001	Tsunenobu Hori	11-073	9032

23400 7590 12/12/2003

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RESTON, VA 20190

EXAMINER

PERRY, ANTHONY T

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/988,688

Applicant(s)

HORI, TSUNENOBU

Examiner

Anthony T Perry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 29 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

The Amendment, filed on 8/29/03, has been entered and acknowledged by the Examiner.

Claim 14 has been canceled.

New claims 15-21 have been added.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 3, 6, 15, and 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129).

Regarding claim 1, 15 and 17, Fig. 4 of the Pfeil reference shows a spark plug comprising a metal shell 10, a center electrode 5 retained in the metal shell and insulated from the metal shell, and a ground electrode 8 opposed to the center electrode. The ground electrode is welded at an end thereof directly to the metal shell. Pfeil teaches that the ground electrode is spot-welded to the metal shell but does not specifically state that the it is spot-welded using an arc welding technique. However, two types of spot-welding include TIG welding (GTAW) and MIG welding (GMAW), which are types of arc welding. One of ordinary skill in the art would have found it obvious at the time the invention was made to have used MIG (Metal Inert Gas) welding commonly known as Gas Metal Arc Welding (GMAW) to spot-weld the ground electrode to the metal shell

since MIG welding offers high welding speeds and causes a minimal distortion of the workpiece. Pfeil does not teach the center electrode having a tip portion made of a material different from the material of the body portion.

However, Gotou teaches welding a noble metal chip to the tip of the center electrode to improve sparking performance and ignitability in consideration of cleaner exhaust and lean combustion while avoiding the dissipation of the electrode (col. 1, lines 20-40). Gotou teaches the center electrode body portion being made of nickel while an acceptable material for the tip portion is an iridium-platinum alloy (col. 6, lines 24-29).

Regarding claims 2 and 6, Pfeil teaches that electrodes are commonly made of a platinum-iridium alloy having 80% platinum and 20% iridium (col. 1, lines 3-7) and that the electrode is connected directly to the metal shell by a welding material.

Regarding claims 3, Pfeil in view of Gotou discloses the claimed invention except for the limitation of the welding depth range of the ground electrode and the metal shell. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth, since optimization of workable ranges is considered within the skill of the art.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) as applied to claim 1 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 4-5, Pfeil and Gotou fail to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark

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plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a metal shell with excellent tensile strength.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) as applied to claim 1, and further in view of Franks (US 3,958,144).

Regarding claim 7, Pfeil and Gotou fail to specifically teach the ground electrode being made of 50 wt% or more of Ir. However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to make ground electrode of 60 wt% of iridium with an additive of nickel in order to provide the spark plug with an improved sparking operation.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) as applied above in claim 1 and 15, and further in view of Matsubara et al. (US 6,095,124).

Regarding claim 16, Pfeil and Gotou fail to specifically teach the body portion including a core portion made of a material different from the external portion made of a

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nickel. However, the Matsubara reference teaches the center electrode body portion having a core made of copper which has an excellent thermal conductivity in order to improve heat transfer while the external portion is made of nickel which is a heat resistant metal. Accordingly, one of ordinary skill in the art at the time of the invention would have found it obvious to include a core portion made of copper to improve heat transfer.

Claim 8, 9, 10, 13, 18, 20, and 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) and further in view of Franks (US 3,958,144).

Regarding claims 8, 13, 18 and 20 Fig. 4 of the Pfeil reference shows a spark plug comprising a metal shell 10, a center electrode 5 retained in the metal shell and insulated from the metal shell, and a ground electrode 8 opposed to the center electrode. Pfeil does not teach the center electrode having a tip portion made of a material different from the material of the body portion.

However, Gotou teaches welding a noble metal chip to the tip of the center electrode to improve sparking performance and ignitability in consideration of cleaner exhaust and lean combustion while avoiding the dissipation of the electrode (col. 1, lines 20-40). Gotou teaches the center electrode body portion being made of nickel while an acceptable material for the tip portion is an iridium-platinum alloy (col. 6, lines 24-29). Pfeil and Gotou fail to specifically teach the ground electrode being made of 50 wt% or more of Ir.

However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking

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operation considerably improved over previous spark plugs (col. 1, lines 44-64).

Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to make ground electrode of 60 wt% of iridium with an additive of nickel in order to provide the spark plug with an improved sparking operation.

Regarding claim 9, Pfeil teaches that the ground electrode is welded at an end thereof directly to the metal shell. Pfeil teaches that the ground electrode is spot-welded to the metal shell. A popular type of spot-welding is resistance welding. It is noted that there is no structural difference between a resistance welding material and a laser welding material as claimed. Even so, it is taught by Gotou using resistance welding to weld two metals of such different thermal expansion coefficients the welding portion is likely to be damaged due to the thermal stress. Gotou teaches that laser welding two materials of such different thermal expansion coefficients greatly reduces the thermal stress and results in a high bonding strength. Accordingly, one of ordinary skill in the art would have found it obvious to connect the ground electrode which is made of a noble metal to the metal shell thorough laser welding in order to reduce the thermal stress in the molten bond and increase the strength of the bond between the ground electrode and the metal shell.

Regarding claim 10, Pfeil in view of Gotou in view of Franks discloses the claimed invention except for the limitation of the welding depth range of the ground electrode and the metal shell. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in

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the art at the time the invention was made to provide a workable range for the welding depth, since optimization of workable ranges is considered within the skill of the art.

Regarding claim 21, it is noted that the applicant's specific L-shape electrode does not solve any of the stated problems or yield any unexpected result that is not within the scope of the teachings applied. Therefore it is considered to be a matter of choice, which is a person of ordinary skill in the art would have found obvious to select any shape ground electrode as long as it opposes the center electrode. Furthermore, the use of L-shaped electrodes is well known in the art as evidenced by Gotou.

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) further in view of Franks (US 3,958,144) as applied to claim 8 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 11-12, Pfeil and Gotou fail to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a metal shell with excellent tensile strength.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Gotou et al. (US 6,078,129) further in view of Franks (US



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3,958,144) as applied above in claim 8 and 18, and further in view of Matsubara et al. (US 6,095,124).

Regarding claim 19, Pfiel, Gotou, and Franks fail to specifically teach the to specifically teach the body portion including a core portion made of a material different from the external portion made of nickel. However, the Matsubara reference teaches the center electrode body portion having a core made of copper which has an excellent thermal conductivity in order to improve heat transfer while the external portion is made of nickel which is a heat resistant metal. Accordingly, one of ordinary skill in the art at the time of the invention would have found it obvious to include a core portion made of copper to improve heat transfer in the electrode.

### ***Response to Arguments***

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is (703) 305-1799. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (703) 305-4794. The fax phone number for this Group is (703) 308-7382.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [**Anthony.perry@uspto.gov**].

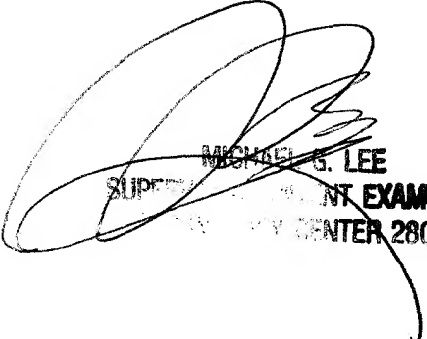
*All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.*

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

ATP

Anthony Perry  
Patent Examiner  
Art Unit 2879  
December 1, 2003

  
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